#4

FLOW SCHEMATIC FOR FIELD SUPPLIED DATA ENTRY AND BASE STATION OR SERVICE PROVIDER SUPPLIED COMPUTER ASSISTANCE

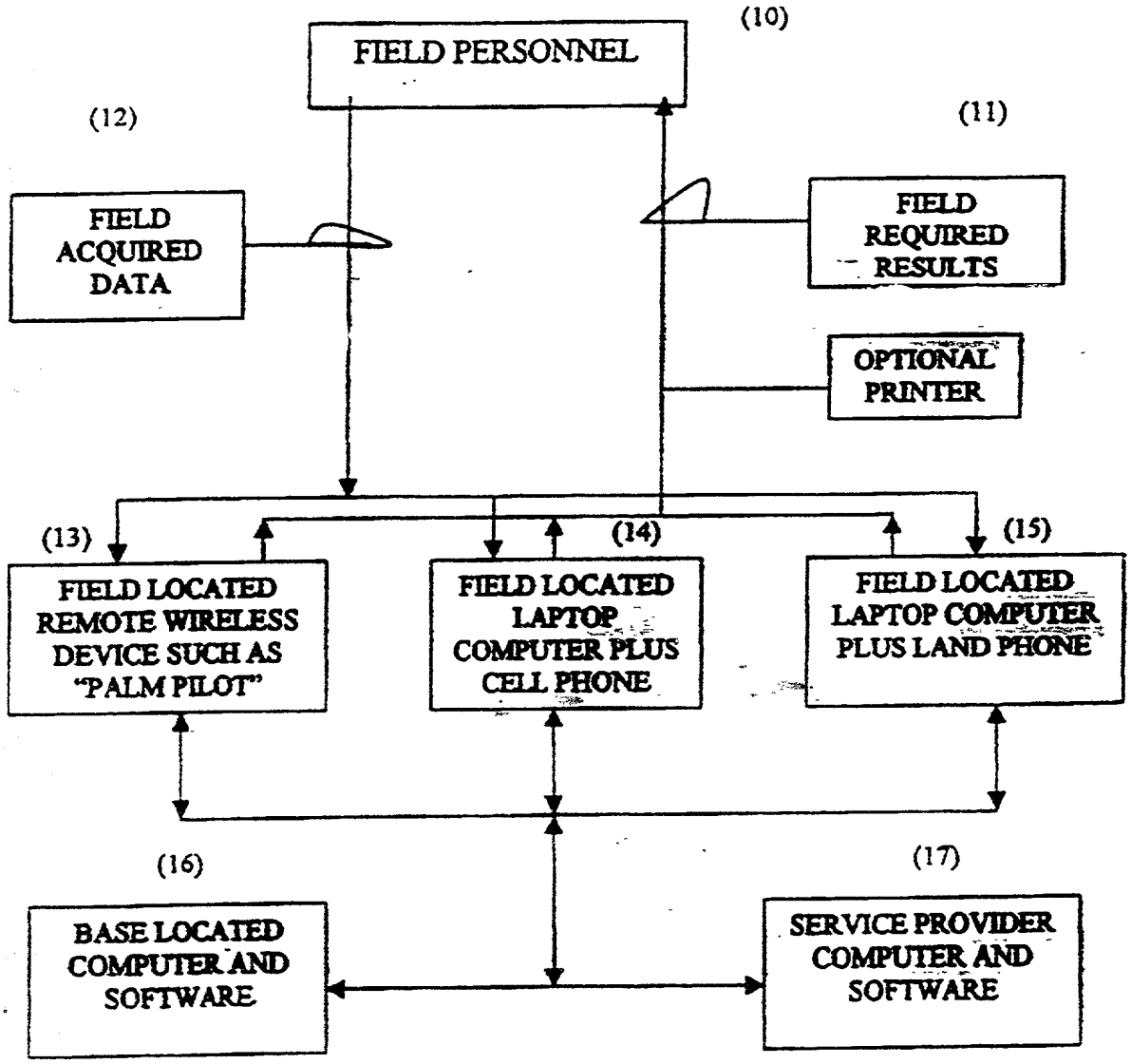


FIG. 1

09924959 . 111501

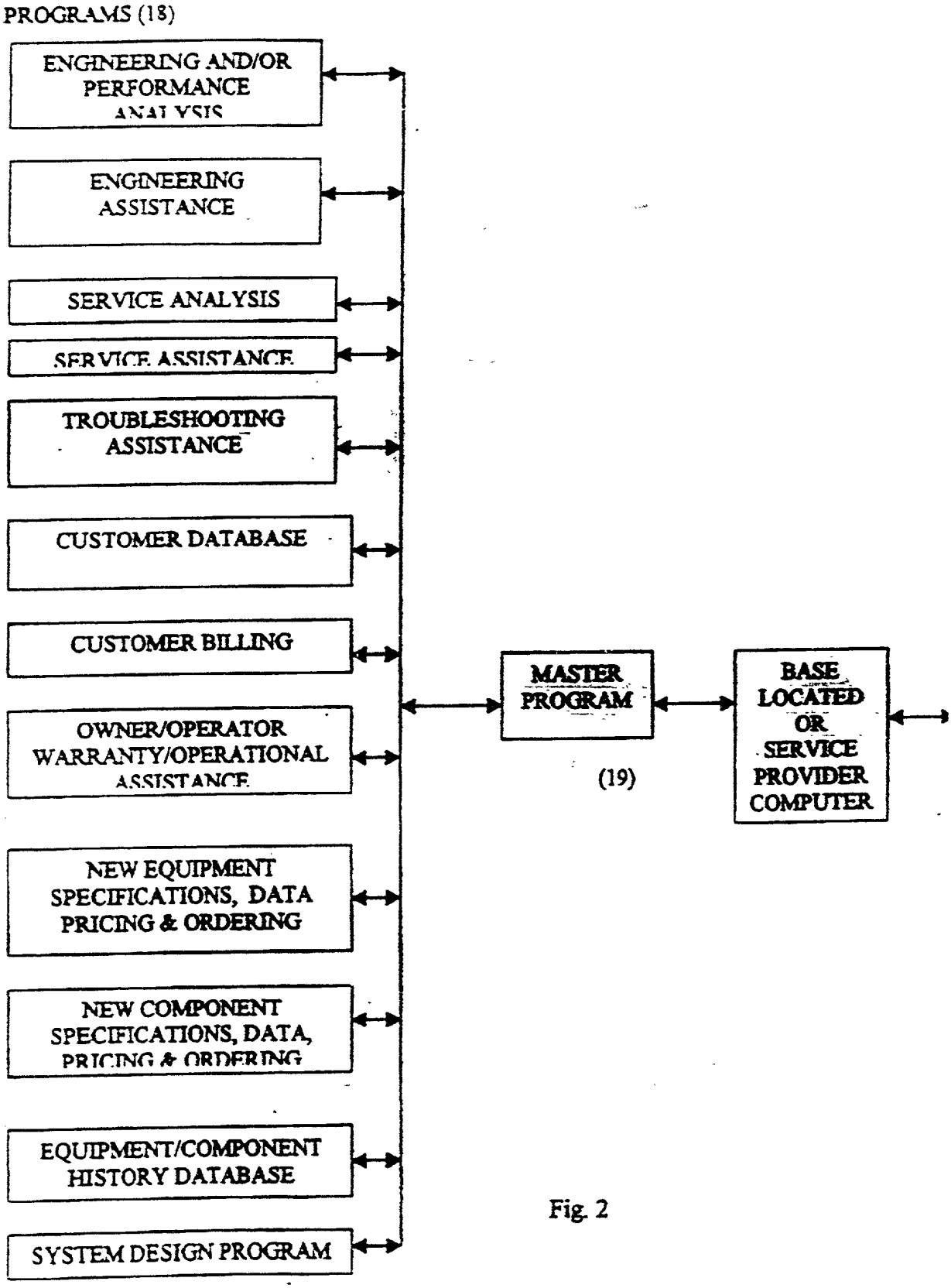

PROGRAMS (18)
ENGINEERING AND/OR PERFORMANCE ANALYSIS
ENGINEERING ASSISTANCE
SERVICE ANALYSIS
SERVICE ASSISTANCE
TROUBLESHOOTING ASSISTANCE
CUSTOMER DATABASE
CUSTOMER BILLING
OWNER/OPERATOR WARRANTY/OPERATIONAL ASSISTANCE
NEW EQUIPMENT SPECIFICATIONS, DATA PRICING & ORDERING
NEW COMPONENT SPECIFICATIONS, DATA, PRICING & ORDERING
EQUIPMENT/COMPONENT HISTORY DATABASE
SYSTEM DESIGN PROGRAM
MASTER PROGRAM
(19)
BASE LOCATED OR SERVICE PROVIDER COMPUTER

Fig. 2

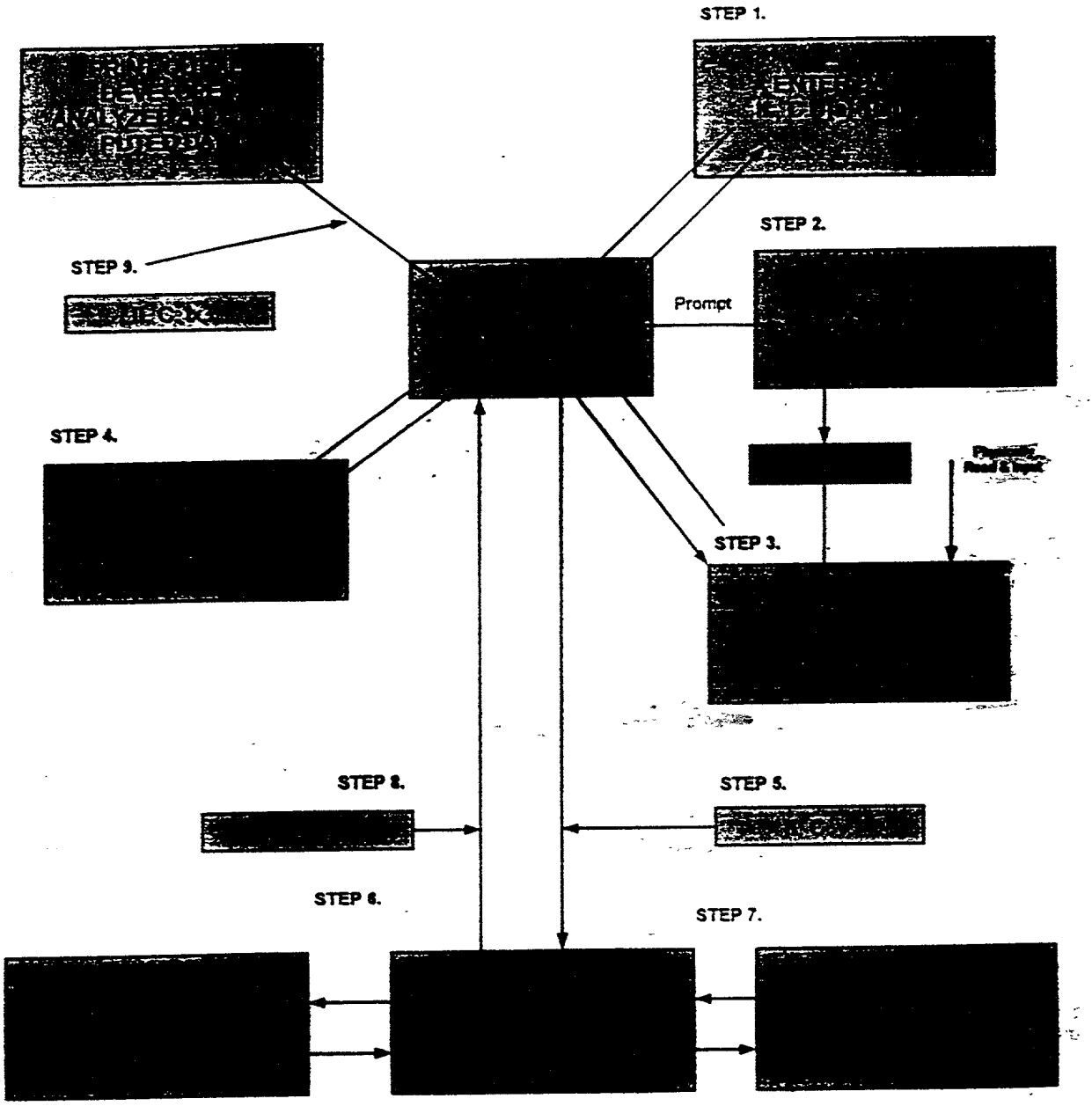

STEP 1.
STEP 2.
Prompt
STEP 3.
STEP 4.
STEP 5.
STEP 6.
STEP 7.
STEP 8.
STEP 9.

FIG. 3

TOSTEE 656h2660

I. AVAILABLE INFORMATION DATA SHEET:

PART A

TYPE OF ANALYSIS (X which applies): *Perf* ____ *Trblshtg* ____ *T & B* ____

Job Name: ____ **Phone:** ____ **Fax:** ____

Job Address: *street* ____ *city* ____ *state* ____ *zip* ____

Other: *(e -mail)* ____ *other* ____

Date: ____ **Start Time:** ____

Refrigerant Type: ____ **Air-cooled (X)** ____ **Water-cooled (X)** ____

Unit Number or Specific Location: ____

Type of Systm (X): **Chiller** ____ **Package** ____ **Split** ____ **A/C** ____ **H/P** ____ **Refrig** ____

PART B

	manuf	*quantity*	*model no*	*serial no*	*fan speed*
Package System					
Chiller/Condenser					
Fan Coil Unit :					
Split System Condenser A/C					
Split System Condenser H/P					
Split System Air Handler					
Refrigeration Unit Condenser					
Refrigeration Unit Evaporator					

DATA PLATE INFORMATION	*mfg*	*model no*	*serial no*	*hp*	*rpm*	*FLA/RLA*	*LRA*	*volts*	*phase*	*hz*
Condenser Fan Motor										
Blower Fan Motor										
Compressor No 1										
Compressor No 2										
Compressor No 3										
Compressor No 4										

Main Supply Plenum Dimensions ____ **Return Plenum Dim** ____

Previous Month Electrical Consumption (KW) ____ **Total Cost ($)** ____

Previous Month System Water Consumption (Gals) ____ **Total Cost ($)** ____

Previous Month Gas Consumption (Cu Ft) ____ **Total Cost ($)** ____

Fig. 4a

Miscellaneous Data Sheet

Condition of:	(X which applies) Good	Bad	Explanation
Condenser Coil			
Evaportor Coil			
Cabinetry AH			
Cabinetry Cond			
Ductwork			
Liquid Line Dryer			
Suction Line Dryer			
Suction Accumulator			
Liquid Receiver			
Reversing Valve			
Expansion Device			
Refrigerant Lines			
Condenser Fan Motor			
Condenser Fan Blade			
Evaporator Blower Motor			
Evaporator Blower Shaft			
Evaporator Blower Bearings			
Evaporator Blower Belts			
Electrical Wiring			
Capacitors			
Contactors			
Relays			
Transformers			
Other Component (input below)			

Obvious Oil Leak Locations

FIG. 4b

7,654,095 • Feb. 2, 2010

III. OPERATIONAL DATA SHEET:

Temperatures, Refrigerant (X which applies)	Fahrenheit	Celsius
Hot Gas Discharge at Compressor		
Hot Gas Entering Condenser		
Mid Condenser Coil		
Liquid out of condenser		
Liquid into expansion device		
Mid Evaporator coil		
Suction line after evaporator		
Suction line into compressor		
Heat Pump, Suction line into rev Valve		
Heat Pump, Hot Gas line into rev Valve		

Temperatures, Air (X which applies)		Fahrenheit	Celsius
Air Entering Condenser	DB		
Air Entering Condenser	WB		
Air Exiting Condenser	DB		
Air Entering Evaporator	DB		
Air Entering Evaporator	WB		
Air Exiting Evaporator	DB		
Air Exiting Evaporator	WB		
Air Exiting Air Handler	DB		
Air Exiting Air Handler	WB		

Pressures, Refrigerant (X which applies)	PSIG	PSIA
Hot Gas Discharge @ compressor		
Hot Gas Discharge @ condenser		
Liquid Refrigerant exit condenser		
Liquid Refrigerant enter Exp Device		
Suction Gas exiting evaporator		
Suction Gas entering compressor		

Pressures, Air Flow (in inches water gauge)
Static before Air Handler
Static after Air Handler
Velocity pressure Transverse Avg at straight duct section with dimensions given for main supply or return plenums

Electrical Data (Running)		Amps L1	Amps L2	Amps L3	Volts	Phase	hz
Compressor No 1							
Compressor No 2							
Compressor No 3							
Compressor No 4							
Condenser Fan Motors							
Quantity							
Blower Motors							
Quantity							
Pumps - Chiller Circ	1						
	2						
Evaporative Tower	1						
	2						
Water Cooled Circ	1						
	2						

Temperatures, Water (X which applies)		Fahrenheit	Celsius
Chiller	EWT		
	LCWT		
Water Cooled Condenser	EWT		
	LWT		

Water Flow Rate (X which applies)		PSIG	PSIA
Chiller, Evaporator	Return Line		
Chiller, Evaporator	Supply Line		
Water Cooled Equip Condenser	Return Line		
Condenser	Supply Line		

FIG. 4C

IV. TROUBLE SHOOTING QUESTIONNAIRE DATA SHEET

Mark all those that apply (X)

- ☐ Chiller Condenser
  - ☐ Air Cooled
  - ☐ Water Cooled
- ☐ Geothermal
- ☐ Dual Source

Symptom (examples - list to be added to)

- ☐ Unit will not run
- ☐ Outdoor unit section will not run
- ☐ Compressor will not start
- ☐ Outdoor fan motor will not start
- ☐ Outdoor unit condenser water pump will not start
- ☐ Compressor hums but will not start
- ☐ Compressor cycling on overload
- ☐ Compressor off on high pressure control
- ☐ Noisy compressor
- ☐ Compressor loses oil
- ☐ No cooling, but compressor runs continuously
- ☐ Liquid Refrigerant flooding compressor (cap tube system)
- ☐ Liquid Refrigerant flooding compressor (fixed orifice)
- ☐ Liquid Refrigerant flooding compressor (TXV)
- ☐ High head pressure
- ☐ Low head pressure
- ☐ High Suction Pressure
- ☐ Low suction pressure
- ☐ High operating costs
- ☐ Other

☐ Water Tower

Symptom (examples - list to be added to)

- ☐ Fan motor will not run
- ☐ Cooling return water temperature high
- ☐ Scale buildup is rapid
- ☐ Sump water hardness is high
- ☐ Other

☐ Fan Coil Unit

Symptom (examples - list to be added to)

- ☐ Fan motor will not run
- ☐ No cooling, but fan is on
- ☐ Too much cooling
- ☐ Other

FIG. 4d

EP 0 711 965 A2

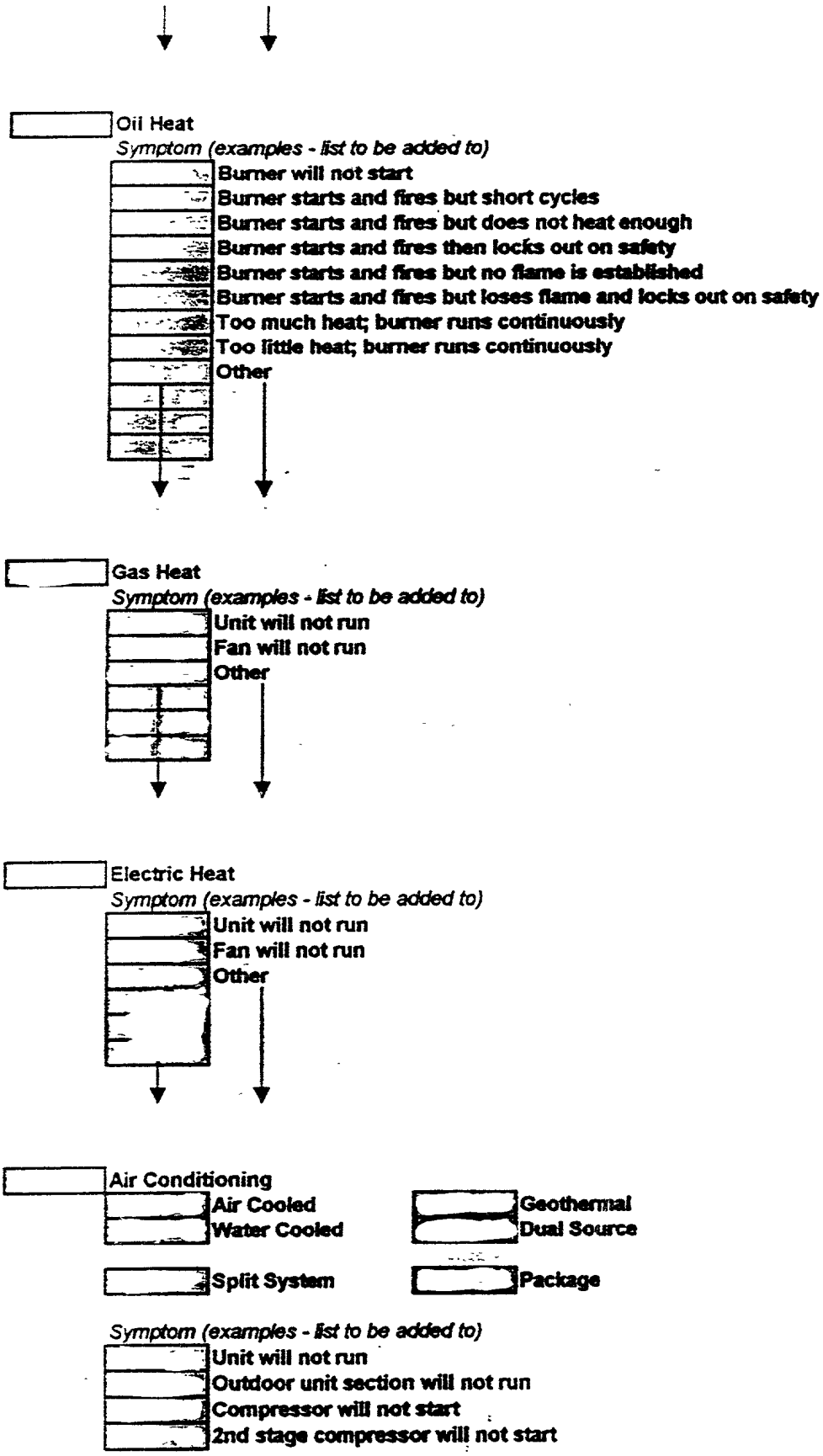

Oil Heat
Symptom (examples - list to be added to)
Burner will not start
Burner starts and fires but short cycles
Burner starts and fires but does not heat enough
Burner starts and fires then locks out on safety
Burner starts and fires but no flame is established
Burner starts and fires but loses flame and locks out on safety
Too much heat; burner runs continuously
Too little heat; burner runs continuously
Other
Gas Heat
Symptom (examples - list to be added to)
Unit will not run
Fan will not run
Other
Electric Heat
Symptom (examples - list to be added to)
Unit will not run
Fan will not run
Other
Air Conditioning
Air Cooled
Water Cooled
Geothermal
Dual Source
Split System
Package
Symptom (examples - list to be added to)
Unit will not run
Outdoor unit section will not run
Compressor will not start
2nd stage compressor will not start

FIG. 4e

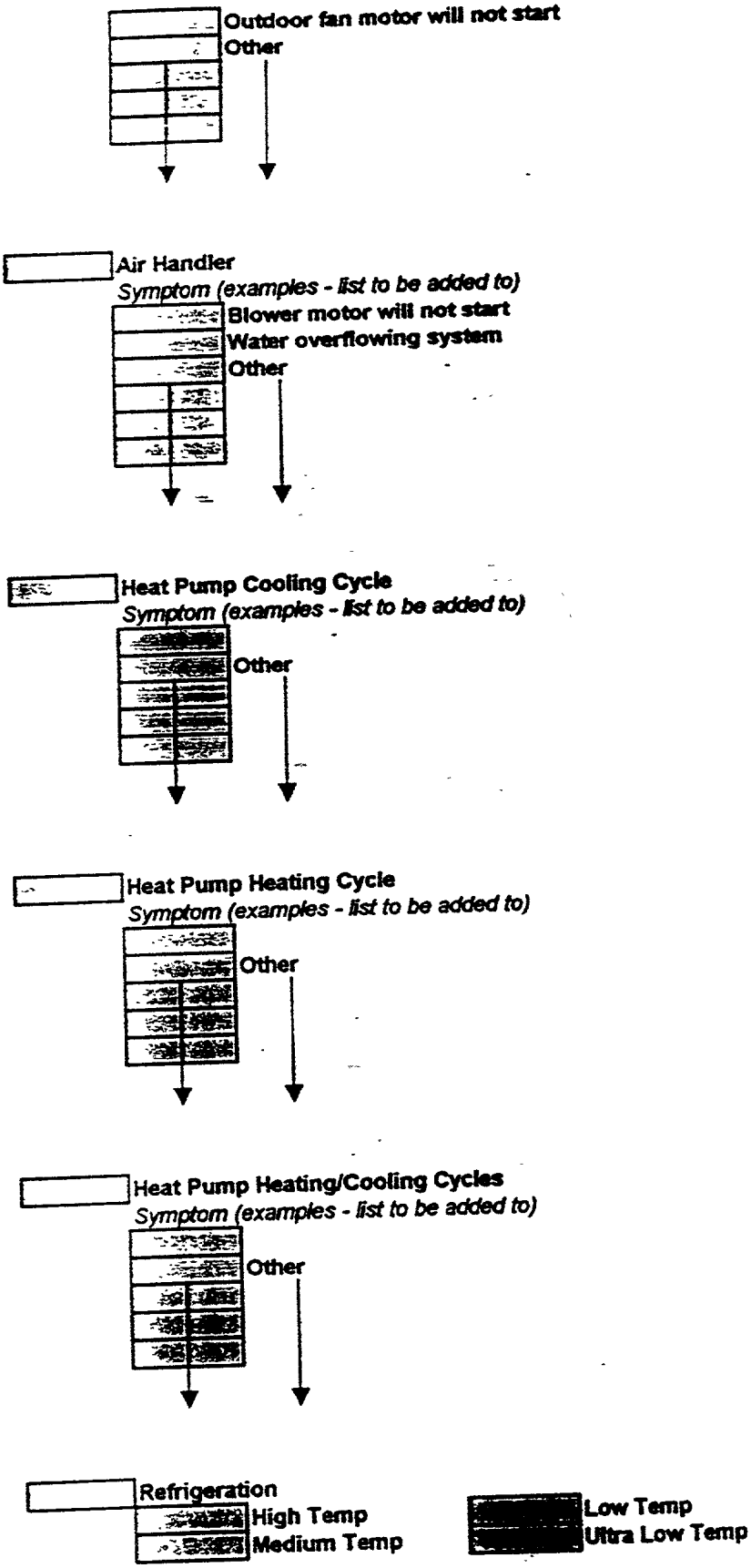

Outdoor fan motor will not start
Other
Air Handler
Symptom (examples - list to be added to)
Blower motor will not start
Water overflowing system
Other
Heat Pump Cooling Cycle
Symptom (examples - list to be added to)
Other
Heat Pump Heating Cycle
Symptom (examples - list to be added to)
Other
Heat Pump Heating/Cooling Cycles
Symptom (examples - list to be added to)
Other
Refrigeration
High Temp
Medium Temp
Low Temp
Ultra Low Temp

FIG. 4f

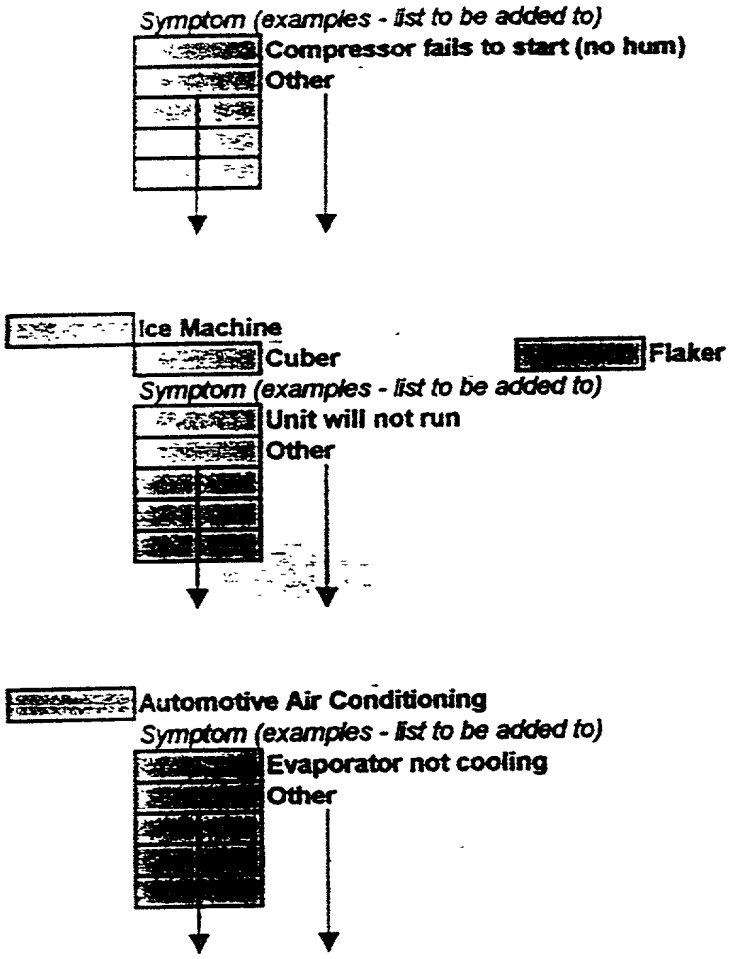
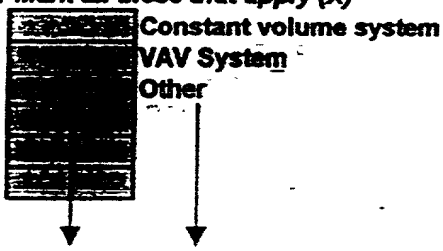

Symptom (examples - list to be added to)
Compressor fails to start (no hum)
Other
Ice Machine
Cuber
Flaker
Symptom (examples - list to be added to)
Unit will not run
Other
Automotive Air Conditioning
Symptom (examples - list to be added to)
Evaporator not cooling
Other

FIG. 4g

V. TEST AND BALANCE - AIR VOLUME DATA SHEET

A. ***Mark all those that apply (X)***



B. ***Fill in all appropriate (highlighted) below:***

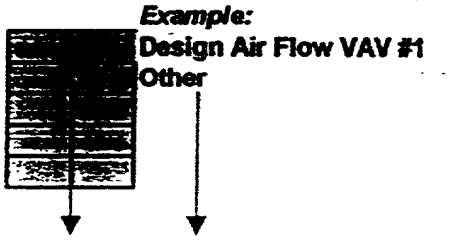


FIG. 4h

TOSTT "6586h2660

I. AVAILABLE INFORMATION DATA SHEET:

PART A

TYPE OF ANALYSIS (X which applies): *Perf* [X] *Trblshtg* [ ] *T & B* [ ]

Job Name: XYZ Homeowner **Phone:** (888)555-8080 **Fax:** (888)555-8080

Job Address: *street* 3333 Anywhere St. *city* St. Pete *state* Fla. *zip* 32655

Other: *(e-mail)* www.Homeowner.com *other*

Date: 7/6/01 **Start Time:** 1:40 PM

Refrigerant Type: R-22 **Air-cooled (X)** [X] **Water-cooled (X)** [ ]

Unit Number or Specific Location: Only system at residence

Type of Systm (X): **Chiller** [ ] **Package** [ ] **Split** [X] **A/C** [ ] **H/P** [X] **Refrig** [ ]

PART B

	manuf	*quantity*	*model no*	*serial no*	*fan speed*
Package System					
Chiller/Condenser					
Fan Coil Unit :					
Split System Condenser A/C					
Split System Condenser H/P					
Split System Air Handler					
Refrigeration Unit Condenser					
Refrigeration Unit Evaporator					

DATA PLATE INFORMATION	*mfg*	*model no*	*serial no*	*hp*	*rpm*	*FLA/RLA*	*LRA*	*volts*	*phase*	*hz*
Condenser Fan Motor										
Blower Fan Motor										
Compressor No 1										
Compressor No 2										
Compressor No 3										
Compressor No 4										

Main Supply Plenum Dimensions		**Return Plenum Dim**	
Previous Month Electrical Consumption (KW)		**Total Cost ($)**	
Previous Month System Water Consumption (Gals)		**Total Cost ($)**	
Previous Month Gas Consumption (Cu Ft)		**Total Cost ($)**	

FIG. 5A

III. OPERATIONAL DATA SHEET:

Temperatures, Refrigerant (X which applies)	Fahrenheit	Celsius
Hot Gas Discharge at Compressor		
Hot Gas Entering Condenser		
Mid Condenser Coil		
Liquid out of condenser		
Liquid into expansion device		
Mid Evaporator coil		
Suction line after evaporator		
Suction line into compressor		
Heat Pump, Suction line into rev Valve		
Heat Pump, Hot Gas line into rev Valve		

Temperatures, Air (X which applies)		Fahrenheit	Celsius
Air Entering Condenser	DB		
Air Entering Condenser	WB		
Air Exiting Condenser	DB		
Air Entering Evaporator	DB		
Air Entering Evaporator	WB		
Air Exiting Evaporator	DB		
Air Exiting Evaporator	WB		
Air Exiting Air Handler	DB		
Air Exiting Air Handler	WB		

Pressures, Refrigerant (X which applies)	PSIG	PSIA
Hot Gas Discharge @ compressor		
Hot Gas Discharge @ condenser		
Liquid Refrigerant exit condenser		
Liquid Refrigerant enter Exp Device		
Suction Gas exiting evaporator		
Suction Gas entering compressor		

Pressures, Air Flow (in inches water gauge)	
Static pressure A	
Static pressure B	
Velocity pressure	

straight duct section with dimensions given for main supply or return plenums

Electrical Data (Running)		Amps L1	Amps L2	Amps L3	Volts	Phase	hz
Compressor No 1							
Compressor No 2							
Compressor No 3							
Compressor No 4							
Condenser Fan Motors							
Quantity							
Blower Motors							
Quantity							
Pumps - Chiller Circ	1						
	2						
Evaporative Tower	1						
	2						
Water Cooled Circ	1						
	2						

Temperatures, Water (X which applies)		Fahrenheit	Celsius
Chiller	EWT		
	LCWT		
Water Cooled Condenser	EWT		
	LWT		

Water Flow Rate (X which applies)		PSIG	PSIA
Chiller, Evaporator	Return Line		
Chiller, Evaporator	Supply Line		
Water Cooled Equip			
Condenser	Return Line		
Condenser	Supply Line		

FIG. 5b

TOSTI 656h2650

I. AVAILABLE INFORMATION DATA SHEET:

PART A

TYPE OF ANALYSIS (X which applies): Perf [X] Trblshtg [ ] T & B [ ]

Job Name: XYZ Homeowner Phone: (000)555-0000 Fax: (000)555-0000

Job Address: street 3333 Anywhere St. city St. Pete state Fla. zip 32655

Other: (e-mail) www.Homeowner.com other

Date: 7/6/01 Start Time: 1:40 PM

Refrigerant Type: R-22 Air-cooled (X) [X] Water-cooled (X) [ ]

Unit Number or Specific Location: Only system at residence

Type of Systm (X): Chiller [ ] Package [ ] Split [X] A/C [ ] H/P [X] Refrig [ ]

Chiller: Oil Heat [ ] Package: Gas Heat [ ] Split: Elec Heat [X]

PART B

	manuf	quantity	model no	serial no	fan speed
Package System					
Chiller/Condenser					
Fan Coil Unit :					
Split System Condenser A/C					
Split System Condenser H/P	Evcon	1	BRH3024[illegible]	[illegible]	N.A.
Split System Air Handler	Evcon		AH20-05[illegible]	[illegible]	High
Refrigeration Unit Condenser					
Refrigeration Unit Evaporator					

DATA PLATE INFORMATION

	mfg	model no	serial no	hp	rpm	FLA/RLA	LRA	volts	phase	hz
Condenser Fan Motor	A.O. Smith	N.A.	N.A.	1/3	1100	1.9	N/A	208/230	1	60
Blower Fan Motor	A.O. Smith	N.A.	N.A.	1/2	1100	5.2	N/A	208/230	1	60
Compressor No 1	Bristol	H25A6Q[illegible]	[illegible]	N.A.	N.A.	21.7	135	208/230	1	60
Compressor No 2										
Compressor No 3										
Compressor No 4										

Main Supply Plenum Dimensions	20x20"	Return Plenum Dim	20"x24"
Previous Month Electric Consumption (KWH)	846	Total Cost ($)	67.99
Previous Month System Water Consumption (Gals)		Total Cost ($)	
Previous Month Gas Consumption (Cu Ft)		Total Cost ($)	

FIG. 6a

III. OPERATIONAL DATA SHEET:

Temperatures, Refrigerant (X which applies)	Fahrenheit X	Celsius
Hot Gas Discharge at Compressor		200
Hot Gas Entering Condenser		
Mid Condenser Coil		
Liquid out of condenser		124
Liquid into expansion device		124
Mid Evaporator coil		
Suction line after evaporator		
Suction line into compressor		75
Heat Pump, Suction line into rev Valve		
Heat Pump, Hot Gas line into rev Valve		

Temperatures, Air (X which applies)		Fahrenheit X	Celsius
Air Entering Condenser	DB		92
Air Entering Condenser	WB		
Air Exiting Condenser	DB		
Air Entering Evaporator	DB		75.0
Air Entering Evaporator	WB		65.0
Air Exiting Evaporator	DB		N.A.
Air Exiting Evaporator	WB		N.A.
Air Exiting Air Handler	DB		59.0
Air Exiting Air Handler	WB		58.4

Pressures, Refrigerant (X which applies)	PSIG X	PSIA
Hot Gas Discharge @ compressor		N.A.
Hot Gas Discharge @ condenser		
Liquid Refrigerant exit condenser		275
Liquid Refrigerant enter Exp Device		N.A.
Suction Gas exiting evaporator		
Suction Gas entering compressor		58

Pressures, Air Flow (in inches water gauge)	
Static before Air Handler	-.15
Static after Air Handler	+.25
Velocity pressure Transverse flow at straight duct section with dimensions given for main supply or return plenums	.033

Electrical Data (Running)

		Amps L1	Amps L2	Amps L3	Volts	Phase	hz
Compressor No 1		22.2	22.0	—	232	1	60
Compressor No 2							
Compressor No 3							
Compressor No 4							
Condenser Fan Motors		1.6	1.7	—	232	1	60
Quantity	1						
Blower Motors		3.5	3.6	—	232	1	60
Quantity	1						
Pumps - Chiller Circ	1						
	2						
Evaporative Tower	1						
	2						
Water Cooled Circ	1						
	2						

Temperatures, Water (X which applies)		Fahrenheit	Celsius
Chiller	EWT		
	LCWT		
Water Cooled Condensar	EWT		
	LWT		

Water Flow Rate (X which applies)		PSIG	PSIA
Chiller, Evaporator	Return Line		
Chiller, Evaporator	Supply Line		
Water Cooled Equip Condenser	Return Line		
Condenser	Supply Line		

FIG. 6b

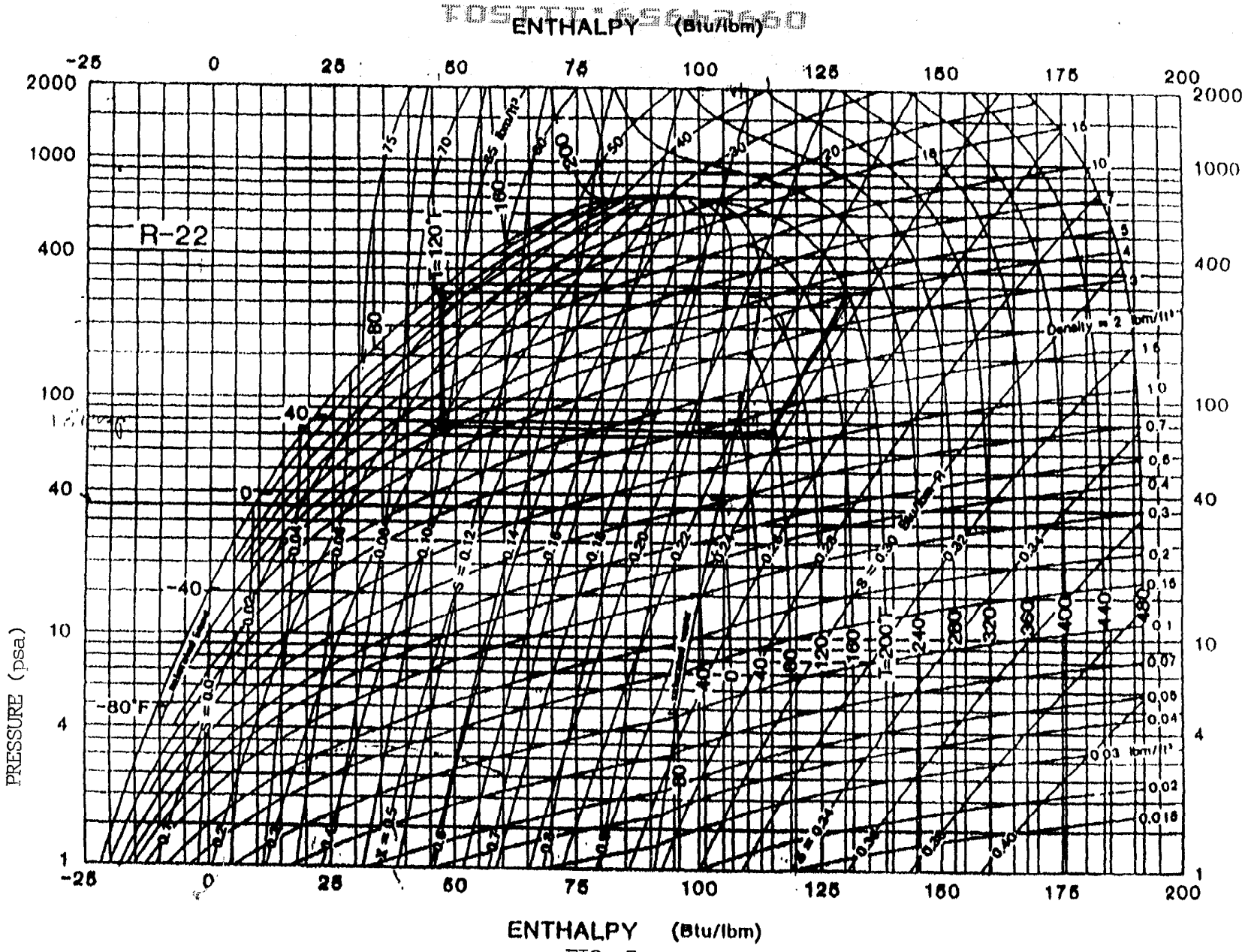

ENTHALPY (Btu/lbm)
-25
0
25
50
75
100
125
150
175
200
2000
1000
400
100
40
10
4
1
R-22
PRESSURE (psa)
ENTHALPY (Btu/lbm)

FIG. 7

Refrigerant 22 (Chlorodifluoromethane) Properties of Saturated Liquid and Saturated Vapor

Temp.,[a] °F	Pressure, psia	Density, lb/ft³ Liquid	Volume, ft³/lb Vapor	Enthalpy, Btu/lb Liquid	Enthalpy, Btu/lb Vapor	Entropy, Btu/lb·°F Liquid	Entropy, Btu/lb·°F Vapor	Specific Heat c_p, Btu/lb·°F Liquid	Specific Heat c_p, Btu/lb·°F Vapor	c_p/c_v, Vapor	Velocity of Sound, ft/s Liquid	Velocity of Sound, ft/s Vapor	Viscosity, lb$_m$/ft·h Liquid	Viscosity, lb$_m$/ft·h Vapor	Thermal Cond., Btu/h·ft·°F Liquid	Thermal Cond., Btu/h·ft·°F Vapor	Surface Tension, dynes/cm	Temp.,[a] °F
-250.00	—	107.37	—	-63.169	76.604	-0.21914	0.44952	—	0.1018	1.2914	—	395.	—	—	—	—	—	-250.00
-240.00	—	106.41	—	-56.462	77.629	-0.18786	0.42332	—	0.1033	1.2860	—	403.	—	—	—	—	—	-240.00
-230.00	—	105.48	—	-51.569	78.669	-0.16605	0.40101	—	0.1048	1.2807	—	411.	—	—	—	—	36.75	-230.00
-220.00	0.002	104.58	16805.	-47.705	79.724	-0.14958	0.38211	—	0.1064	1.2754	—	419.	—	—	—	—	35.70	-220.00
-210.00	0.004	103.70	6982.6	-44.426	80.796	-0.13616	0.36538	—	0.1080	1.2703	—	427.	—	—	—	—	34.67	-210.00
-200.00	0.010	102.81	3151.5	-41.474	81.882	-0.12457	0.35048	—	0.1096	1.2653	—	435.	—	—	—	—	33.63	-200.00
-190.00	0.022	101.92	1527.4	-38.706	82.984	-0.11411	0.33715	—	0.1113	1.2604	—	442.	—	—	—	—	32.61	-190.00
-180.00	0.044	101.03	787.79	-36.038	84.100	-0.10439	0.32518	—	0.1130	1.2558	—	449.	—	—	—	—	31.59	-180.00
-170.00	0.084	100.12	429.22	-33.424	85.230	-0.09521	0.31441	—	0.1147	1.2515	—	456.	—	—	—	—	30.58	-170.00
-160.00	0.151	99.22	245.51	-30.839	86.373	-0.08644	0.30470	—	0.1165	1.2474	—	463.	—	—	—	—	29.57	-160.00
-150.00	0.262	98.30	146.65	-28.269	87.528	-0.07800	0.29594	—	0.1183	1.2437	—	470.	—	—	—	—	28.57	-150.00
-140.00	0.435	97.38	91.059	-25.708	88.692	-0.06986	0.28801	—	0.1201	1.2403	—	476.	—	—	—	—	27.57	-140.00
-130.00	0.696	96.46	58.544	-23.150	89.864	-0.06198	0.28082	—	0.1221	1.2374	—	482.	—	—	—	—	26.59	-130.00
-120.00	1.080	95.53	38.833	-20.594	91.040	-0.05435	0.27430	0.2555	0.1241	1.2349	3483.	488.	—	—	—	—	25.61	-120.00
-110.00	1.626	94.60	26.494	-18.038	92.218	-0.04694	0.26838	0.2555	0.1262	1.2329	3384.	494.	—	—	0.0765	—	24.64	-110.00
-100.00	2.384	93.66	18.540	-15.481	93.397	-0.03973	0.26298	0.2557	0.1285	1.2315	3290.	500.	—	—	0.0749	—	23.67	-100.00
-90.00	3.413	92.71	13.275	-12.921	94.572	-0.03271	0.25807	0.2561	0.1308	1.2307	3198.	505.	—	—	0.0734	0.00292	22.71	-90.00
-80.00	4.778	91.75	9.7044	-10.355	95.741	-0.02587	0.25357	0.2567	0.1334	1.2305	3110.	510.	—	—	0.0718	0.00315	21.76	-80.00
-70.00	6.555	90.79	7.2285	-7.783	96.901	-0.01919	0.24945	0.2574	0.1361	1.2310	3023.	514.	—	—	0.0703	0.00338	20.82	-70.00
-60.00	8.830	89.81	5.4766	-5.201	98.049	-0.01266	0.24567	0.2584	0.1389	1.2323	2937.	519.	—	—	0.0688	0.00360	19.89	-60.00
-50.00	11.696	88.83	4.2138	-2.608	99.182	-0.00627	0.24220	0.2596	0.1420	1.2344	2852.	522.	—	—	0.0673	0.00382	18.96	-50.00
-45.00	13.383	88.33	3.7160	-1.305	99.742	-0.00312	0.24056	0.2604	0.1436	1.2358	2810.	524.	—	—	0.0665	0.00393	18.50	-45.00
-41.44b	14.696	87.90	3.4048	-0.377	100.138	-0.00090	0.23944	0.2609	0.1448	1.2369	2780.	525.	—	—	0.0660	0.00401	18.18	-41.44
-40.00	15.255	87.82	3.2880	0.000	100.296	0.00000	0.23899	0.2611	0.1453	1.2374	2768.	526.	—	—	0.0658	0.00404	18.05	-40.00
-35.00	17.329	87.32	2.9185	1.310	100.847	0.00309	0.23748	0.2620	0.1471	1.2393	2725.	527.	—	—	0.0651	0.00414	17.59	-35.00
-30.00	19.617	86.81	2.5984	2.624	101.391	0.00616	0.23602	0.2629	0.1489	1.2414	2683.	528.	—	—	0.0643	0.00425	17.14	-30.00
-25.00	22.136	86.29	2.3202	3.944	101.928	0.00920	0.23462	0.2638	0.1507	1.2437	2641.	530.	—	—	0.0636	0.00435	16.69	-25.00
-20.00	24.899	85.77	2.0774	5.268	102.461	0.01222	0.23327	0.2648	0.1527	1.2463	2599.	531.	—	—	0.0629	0.00445	16.24	-20.00
-15.00	27.924	85.25	1.8650	6.598	102.986	0.01521	0.23197	0.2659	0.1547	1.2493	2557.	532.	—	—	0.0622	0.00456	15.79	-15.00
-10.00	31.226	84.72	1.6784	7.934	103.503	0.01818	0.23071	0.2671	0.1567	1.2525	2515.	533.	—	—	0.0614	0.00466	—	-10.00
-5.00	34.821	84.18	1.5142	9.276	104.013	0.02113	0.22949	0.2684	0.1589	1.2560	2473.	534.	—	—	0.0607	0.00476	—	-5.00
0.00	38.726	83.64	1.3691	10.624	104.515	0.02406	0.22832	0.2697	0.1611	1.2599	2431.	535.	0.615	0.0268	0.0600	0.00486	—	0.00
5.00	42.960	83.09	1.2406	11.979	105.009	0.02697	0.22718	0.2710	0.1634	1.2641	2389.	535.	0.597	0.0271	0.0593	0.00496	—	5.00
10.00	47.538	82.54	1.1265	13.342	105.493	0.02987	0.22607	0.2725	0.1658	1.2687	2346.	535.	0.580	0.0274	0.0586	0.00506	—	10.00
15.00	52.480	81.98	1.0250	14.712	105.968	0.03275	0.22500	0.2740	0.1683	1.2737	2304.	536.	0.563	0.0276	0.0579	0.00516	—	15.00
20.00	57.803	81.41	0.9343	16.090	106.434	0.03561	0.22395	0.2756	0.1709	1.2792	2262.	536.	0.546	0.0279	0.0572	0.00526	—	20.00
25.00	63.526	80.84	0.8532	17.476	106.891	0.03846	0.22294	0.2773	0.1737	1.2851	2219.	536.	0.530	0.0282	0.0566	0.00536	—	25.00
30.00	69.667	80.26	0.7804	18.871	107.336	0.04129	0.22195	0.2791	0.1765	1.2915	2177.	536.	0.515	0.0284	0.0559	0.00546	—	30.00
35.00	76.245	79.67	0.7150	20.275	107.769	0.04411	0.22098	0.2809	0.1794	1.2984	2134.	535.	0.499	0.0287	0.0552	0.00555	—	35.00
40.00	83.280	79.07	0.6561	21.688	108.191	0.04692	0.22004	0.2829	0.1825	1.3059	2091.	535.	0.484	0.0290	0.0545	0.00565	—	40.00
45.00	90.791	78.46	0.6029	23.111	108.600	0.04972	0.21912	0.2849	0.1857	1.3141	2048.	534.	0.470	0.0292	0.0538	0.00575	—	45.00
50.00	98.799	77.84	0.5548	24.544	108.997	0.05251	0.21821	0.2870	0.1891	1.3229	2005.	533.	0.456	0.0295	0.0532	0.00584	—	50.00
55.00	107.32	77.22	0.5111	25.988	109.379	0.05529	0.21732	0.2893	0.1927	1.3324	1962.	532.	0.442	0.0298	0.0525	0.00594	—	55.00
60.00	116.38	76.58	0.4715	27.443	109.748	0.05806	0.21644	0.2916	0.1964	1.3428	1919.	531.	0.429	0.0301	0.0518	0.00604	—	60.00
65.00	126.00	75.93	0.4355	28.909	110.103	0.06082	0.21557	0.2941	0.2003	1.3540	1876.	530.	0.416	0.0303	0.0512	0.00613	—	65.00
70.00	136.19	75.27	0.4026	30.387	110.441	0.06358	0.21472	0.2967	0.2045	1.3663	1832.	528.	0.404	—	0.0505	0.00625	—	70.00
75.00	146.98	74.60	0.3726	31.877	110.761	0.06633	0.21387	0.2994	0.2089	1.3796	1788.	527.	0.392	—	0.0499	0.00632	—	75.00
80.00	158.40	73.92	0.3451	33.381	111.066	0.06907	0.21302	0.3024	0.2135	1.3941	1744.	525.	0.380	—	0.0492	0.00642	—	80.00
85.00	170.45	73.22	0.3199	34.898	111.350	0.07182	0.21218	0.3065	0.2185	1.4100	1700.	523.	0.369	—	0.0486	0.00652	—	85.00
90.00	183.17	72.51	0.2968	36.430	111.616	0.07456	0.21134	0.3088	0.2238	1.4275	1655.	520.	0.358	—	0.0479	0.00661	—	90.00
95.00	196.57	71.79	0.2756	37.977	111.859	0.07730	0.21050	0.3123	0.2295	1.4467	1611.	518.	0.348	—	0.0473	0.00671	—	95.00
100.00	210.69	71.05	0.2560	39.538	112.081	0.08003	0.20965	0.3162	0.2356	1.4678	1566.	515.	0.338	—	0.0466	0.00680	—	100.00
105.00	225.53	70.29	0.2379	41.119	112.278	0.08277	0.20879	0.3203	0.2422	1.4912	1520.	512.	—	—	0.0460	0.00690	—	105.00
110.00	241.14	69.51	0.2212	42.717	112.448	0.08552	0.20793	0.3248	0.2495	1.5173	1474.	509.	—	—	0.0454	0.00699	—	110.00
115.00	257.52	68.71	0.2058	44.334	112.591	0.08827	0.20705	0.3298	0.2573	1.5464	1428.	506.	—	—	0.0447	0.00709	—	115.00
120.00	274.71	67.89	0.1914	45.972	112.704	0.09103	0.20615	0.3353	0.2660	1.5791	1382.	502.	—	—	0.0441	0.00719	—	120.00
125.00	292.73	67.05	0.1781	47.633	112.783	0.09379	0.20522	0.3413	0.2756	1.6160	1334.	498.	—	—	—	—	—	125.00
130.00	311.61	66.17	0.1657	49.319	112.825	0.09657	0.20427	0.3482	0.2864	1.6581	1287.	494.	—	—	—	—	—	130.00
135.00	331.38	65.27	0.1542	51.032	112.826	0.09937	0.20329	0.3559	0.2985	1.7063	1238.	489.	—	—	—	—	—	135.00
140.00	352.07	64.33	0.1434	52.775	112.784	0.10220	0.20227	0.3648	0.3123	1.7621	1189.	485.	—	—	—	—	—	140.00
145.00	373.71	63.35	0.1332	54.553	112.692	0.10504	0.20119	0.3752	0.3282	1.8275	1139.	479.	—	—	—	—	—	145.00
150.00	396.32	62.33	0.1237	56.370	112.541	0.10793	0.20006	0.3873	0.3468	1.9050	1088.	474.	—	—	—	—	—	150.00
160.00	444.65	60.12	0.1063	60.145	112.035	0.11383	0.19757	0.4198	0.3957	2.1126	983.	462.	—	—	—	—	—	160.00
170.00	497.35	57.59	0.0907	64.175	111.165	0.12001	0.19464	0.4711	0.4716	2.4409	873.	448.	—	—	—	—	—	170.00
180.00	554.82	54.57	0.0763	68.597	109.753	0.12668	0.19102	0.5657	0.6073	3.0349	752.	433.	—	—	—	—	—	180.00
190.00	617.53	50.62	0.0625	73.742	107.398	0.13432	0.18613	0.7952	0.9222	4.4150	616.	415.	—	—	—	—	—	190.00
200.00	686.11	44.44	0.0478	80.558	102.309	0.14432	0.17805	—	—	—	—	—	—	—	—	—	—	200.00
205.06c	723.74	32.70	0.0306	91.052	91.052	0.15989	0.15989	—	—	—	0.	0.	—	—	—	—	0.00	205.06

[a]Temperatures are on the ITS–90 scale

b = normal boiling point

c = critical point

FIG. 8

Superheated Vapor — Constant Pressure Tables at Pressure Intervals — R-22

V = volume in cuft/lb; H = enthalpy in Btu/lb; S = entropy in Btu/lb/(°R) (saturation properties in parentheses)

Temp. °F	Absolute Pressure lbsq in. 75 — 60.304 PSIG (34.13 F) V	H	S	80 — 65.304 PSIG (37.76 F) V	H	S	85 — 70.304 PSIG (41.22 F) V	H	S	90 — 75.304 PSIG (44.53 F) V	H	S	95 — 80.304 PSIG (47.71 F) V	H	S
	(0.72740)	(107.644)	(0.22098)	(0.68318)	(107.954)	(0.22029)	(0.64398)	(108.244)	(0.21964)	(0.60897)	(108.516)	(0.21903)	(0.57751)	(108.772)	(0.21846)
40	0.74013	108.862	0.22303	0.69782	108.347	0.22107	—	—	—	—	—	—	—	—	—
50	0.78148	110.393	0.22645	0.70822	110.096	0.22454	0.66115	109.799	0.22272	0.61924	109.496	0.22088	0.58165	109.187	0.21899
60	0.78241	112.119	0.22981	0.72820	111.843	0.22793	0.68030	111.564	0.22614	0.63766	111.280	0.22443	0.59844	110.992	0.22277
70	0.80298	113.843	0.23308	0.74780	113.584	0.23125	0.69906	113.322	0.22948	0.65568	113.058	0.22781	0.61561	112.787	0.22619
80	0.82323	115.568	0.23632	0.76706	115.323	0.23450	0.71748	115.076	0.23278	0.67334	114.827	0.23112	0.63261	114.576	0.22953
90	0.84320	117.291	0.23948	0.78605	117.061	0.23770	0.73559	116.829	0.23598	0.69069	116.594	0.23437	0.64948	116.357	0.23281
100	0.86291	119.019	0.24260	0.80477	118.801	0.24083	0.75343	118.582	0.23915	0.70777	118.359	0.23755	0.66607	118.137	0.23602
110	0.88239	120.749	0.24566	0.82325	120.544	0.24392	0.77104	120.336	0.24226	0.72459	120.127	0.24068	0.68301	119.915	0.23917
120	0.90167	122.486	0.24868	0.84152	122.290	0.24696	0.78842	122.093	0.24532	0.74120	121.894	0.24376	0.69932	121.694	0.24228
130	0.92076	124.226	0.25166	0.85960	124.040	0.24995	0.80561	123.853	0.24833	0.75780	123.665	0.24678	0.71462	123.475	0.24531
140	0.93968	125.973	0.25460	0.87751	125.796	0.25290	0.82263	125.618	0.25130	0.77383	125.439	0.24977	0.73015	125.259	0.24831
150	0.95844	127.726	0.25750	0.89526	127.568	0.25582	0.83948	127.389	0.25422	0.78989	127.218	0.25271	0.74550	127.047	0.25128
160	0.97707	129.487	0.26036	0.91286	129.326	0.25869	0.85619	129.165	0.25711	0.80581	129.002	0.25561	0.76071	128.839	0.25418
170	0.99557	131.255	0.26319	0.93034	131.102	0.26154	0.87277	130.948	0.25997	0.82159	130.793	0.25848	0.77578	130.637	0.25706
180	1.0139	133.032	0.26599	0.94770	132.885	0.26436	0.88923	132.738	0.26279	0.83725	132.589	0.26131	0.79073	132.440	0.25990
190	1.0322	134.817	0.26876	0.96495	134.677	0.26712	0.90556	134.535	0.26558	0.85279	134.393	0.26411	0.80558	134.251	0.26271
200	1.0504	136.611	0.27150	0.98209	136.476	0.26987	0.92182	136.341	0.26833	0.86824	136.205	0.26687	0.82029	136.068	0.26548
210	1.0685	138.414	0.27421	0.99915	138.284	0.27258	0.93797	138.154	0.27105	0.88358	138.024	0.26961	0.83492	137.893	0.26823
220	1.0865	140.226	0.27690	1.0161	140.101	0.27529	0.95404	139.977	0.27376	0.89885	139.851	0.27232	0.84948	139.725	0.27094
230	1.1044	142.047	0.27956	1.0330	141.928	0.27795	0.97003	141.808	0.27644	0.92403	141.687	0.27500	0.86393	141.566	0.27363

FIG. 9

PERFORMANCE TABLE

BRISTOL COMPRESSORS
MODEL H25A56QCBC 60Hz

REFRIGERANT : R22
DISPLACEMENT : 5.46 CUBIC INCHES
MOTOR : 2 -POLE
VOLTAGE : 230-1-60
SUBCOOLING : 15.0 deg F
SUPERHEAT : 20.0 deg F

Release EN: A29905
Revision EN: B15908 Date: 7/94
Preliminary Data

CAPACITY (BTU/HR)

EVAPORATING TEMPERATURE, deg F

CONDENSING TEMPERATURE deg F	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55
80	12512	15425	18645	22184	26057	30279	34864	39825	45178	50956	57113	63724	70782	78305		
90	11331	14025	17018	20325	23960	27937	32271	36975	42064	47552	53453	59782	66553	73779		
100	10079	12554	15322	18398	21796	25530	29614	34063	38890	44110	49737	55785	62269	69203	76600	84475
110		11057	13602	16449	19611	23103	26939	31134	35700	40654	46008	51777	57976	64618	71717	79288
120				14520	17448	20700	24290	28231	32539	37227	42310	47802	53717	60068	66872	74141
130						18365	21710	25400	29450	33875	38688	43903	49536	55599	62108	69076
140								22684	26478	30641	35185	40126	45478	51254	57469	64138
150											31846	36514	41586	47077	53000	59571

POWER (WATTS)

EVAPORATING TEMPERATURE, deg F

CONDENSING TEMPERATURE deg F	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55
80	2163	2319	2465	2599	2721	2830	2925	3005	3071	3121	3155	3172	3171	3153		
90	2231	2404	2566	2719	2860	2990	3108	3213	3304	3382	3444	3492	3523	3538		
100	2271	2459	2640	2812	2974	3127	3268	3399	3518	3626	3716	3795	3860	3909	3943	3961
110		2487	2687	2879	3064	3240	3407	3565	3712	3847	3972	4083	4182	4268	4339	4395
120				2922	3130	3331	3525	3710	3887	4054	4210	4356	4491	4613	4723	4819
130						3400	3621	3836	4043	4242	4433	4614	4785	4946	5096	5234
140								3943	4182	4414	4640	4858	5067	5267	5458	5639
150											4832	5087	5336	5577	5810	6035

CURRENT (AMPS)

EVAPORATING TEMPERATURE, deg F

CONDENSING TEMPERATURE deg F	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55
80	9.9	10.6	11.3	11.8	12.3	12.8	13.1	13.4	13.7	13.9	14.1	14.2	14.2	14.3		
90	10.1	10.9	11.6	12.3	12.8	13.4	13.9	14.3	14.6	15.0	15.2	15.5	15.7	15.9		
100	10.1	11.0	11.9	12.6	13.3	13.9	14.5	15.1	15.5	16.0	16.4	16.8	17.1	17.4	17.7	18.0
110		11.1	12.0	12.9	13.7	14.4	15.1	15.8	16.4	17.0	17.5	18.0	18.5	19.0	19.4	19.8
120				13.1	14.0	14.8	15.7	16.4	17.2	17.9	18.6	19.2	19.8	20.5	21.1	21.6
130						15.1	16.1	17.0	17.9	18.7	19.5	20.3	21.1	21.9	22.7	23.4
140								17.5	18.5	19.5	20.4	21.4	22.3	23.3	24.2	25.1
150											21.2	22.4	23.5	24.6	25.7	26.8

MASS FLOW (LB/HR)

EVAPORATING TEMPERATURE, deg F

CONDENSING TEMPERATURE deg F	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55
80	162.6	199.6	239.7	283.0	329.9	380.4	434.7	493.0	555.5	622.4	693.9	770.1	851.2	937.4		
90	153.9	189.5	228.3	270.4	316.1	365.5	418.8	476.2	537.9	604.0	674.7	750.2	830.7	916.4		
100	142.2	176.5	214.0	255.0	299.6	347.9	400.3	456.8	517.6	582.9	653.0	727.9	807.9	893.1	983.7	1080.0
110		161.3	197.6	237.5	281.0	328.4	379.8	435.4	495.5	560.1	629.5	703.9	783.4	868.2	958.4	1054.4
120				218.7	261.2	307.6	358.2	413.0	472.4	536.3	605.2	679.0	758.1	842.5	932.5	1028.2
130						286.6	336.3	390.4	449.1	512.4	580.7	654.1	732.8	816.9	906.6	1002.2
140								368.4	426.4	489.2	557.0	630.0	708.3	792.1	881.7	977.1
150											534.9	607.5	685.5	769.1	858.5	953.8

FIG. 10

BLOWER PERFORMANCE DATA

MODEL AH20

Blower Speed	S.C.F.M. at E.S.P.							
	.1	.2	.3	.4	.5	.6	.7	.8
High	2125	2100	2065	2020	1980	1930	1870	1820
Med. High	1730	1710	1695	1675	1655	1620	1600	1585
Low	1385	1375	1365	1360	1345	1280	1300	1280

Note: C.F.M. deliveries shown are with filter and coil in place.

FIG. 12

COOLING PERFORMANCE DATA																
HEAT PUMP MODEL NUMBER:		BRHS060B														
INDOOR COIL MODEL NUMBER:		U25R60RV														
INDOOR AIR		AIR TEMPERATURE ENTERING OUTDOOR UNIT														
		75°			85°			95°			105°			115°		
		CAPACITY MBTUH			CAPACITY MBTUH			CAPACITY MBTUH			CAPACITY MBTUH			CAPACITY MBTUH		
ID CFM	ID DB/WB	T.C.	S.C.	K.W.	T.C.	S.C.	K.W.	T.C.	S.C.	K.W.	T.C.	S.C.	K.W.	T.C.	S.C.	K.W.
1500	85/71	63.7	39.0	4.51	60.4	37.8	4.85	57.1	36.6	5.19	53.7	35.4	5.50	50.2	34.1	5.80
	80/67	58.1	37.4	4.34	55.3	36.3	4.66	52.4	35.1	4.98	49.2	33.8	5.27	46.0	32.5	5.56
	75/63	53.2	36.1	4.22	50.4	34.9	4.52	47.6	33.6	4.81	44.7	32.3	5.08	41.7	31.0	5.30
	73/61	51.1	35.9	4.15	48.5	34.9	4.44	45.9	33.8	4.72	43.0	32.4	4.98	40.1	30.9	5.20
1700	85/71	64.9	41.3	4.55	61.5	40.1	4.89	58.1	38.8	5.23	54.6	37.6	5.54	51.0	36.4	5.85
	80/67	59.3	39.8	4.39	56.3	38.6	4.72	53.3	37.4	5.04	50.1	36.0	5.32	46.8	34.6	5.60
	75/63	54.4	38.1	4.25	51.7	36.9	4.55	48.9	35.7	4.85	45.8	34.3	5.10	42.6	32.8	5.35
	73/61	52.2	38.0	4.20	49.5	36.8	4.49	46.8	35.6	4.77	43.9	34.3	5.01	40.9	32.9	5.25
1900	85/71	65.9	43.4	4.58	62.4	42.2	4.93	58.9	40.9	5.27	55.4	39.7	5.59	51.9	38.4	5.91
	80/67	60.4	41.8	4.43	57.3	40.5	4.76	54.1	39.2	5.08	50.9	37.9	5.36	47.6	36.5	5.64
	75/63	55.5	39.9	4.29	52.6	38.7	4.59	49.6	37.4	4.89	46.4	36.0	5.14	43.1	34.6	5.39
	73/61	53.3	39.9	4.22	50.6	38.7	4.52	47.8	37.4	4.81	44.8	35.9	5.08	41.4	34.4	5.30
NOTE:	All capacities are net with indoor fan already deducted at [illegible] BTUH / [illegible] CFM.										KW rating for outdoor unit only.					

FIG. 13

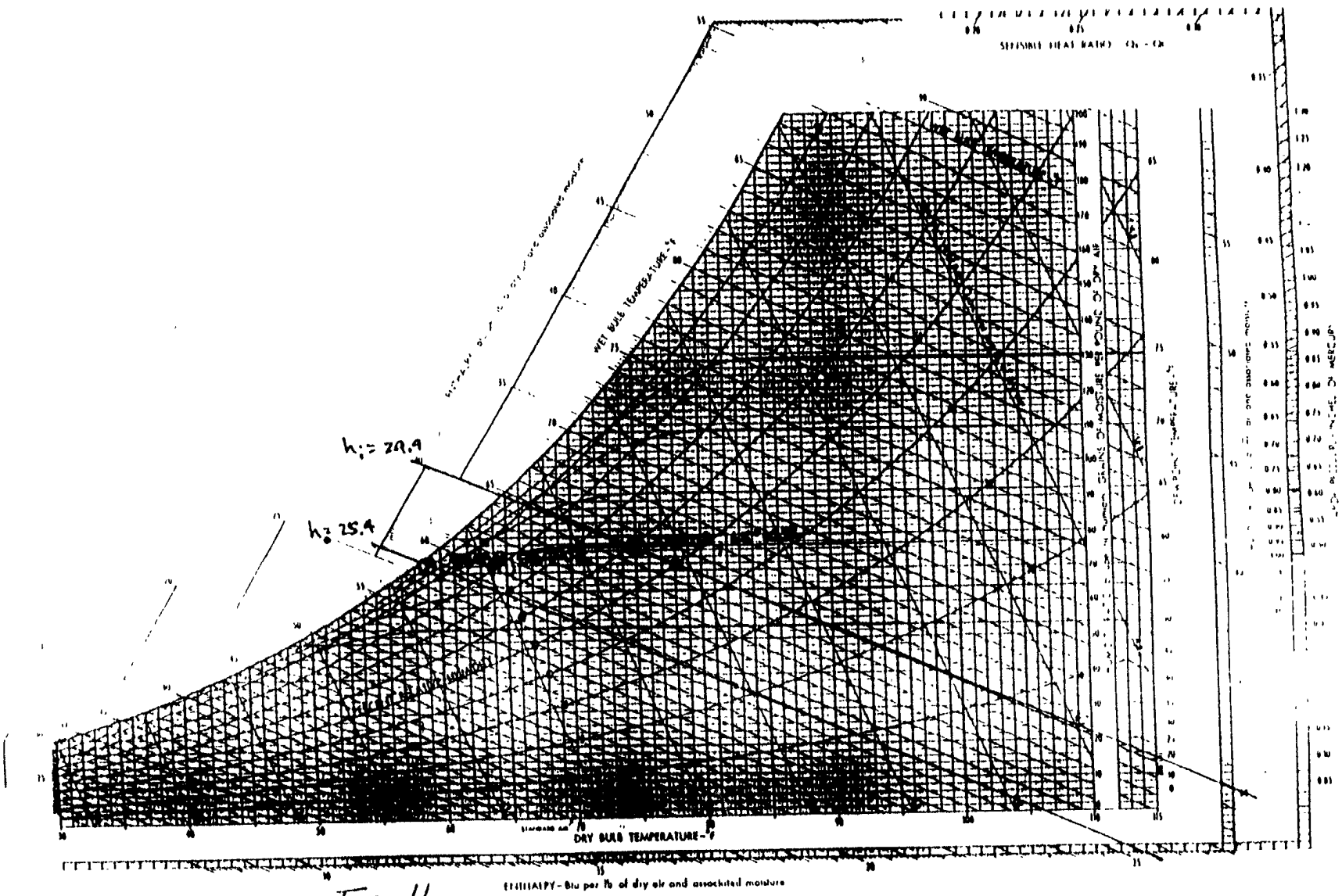

h₁ = 20.9
h₂ = 25.4
DRY BULB TEMPERATURE - °F
ENTHALPY - Btu per lb of dry air and associated moisture

FIG. 11